Mathematics
Grade-Level Expectations

Missouri Department of Elementary and Secondary Education
March 2, 2004

Number and Operations

3/02/04

1. Understand numbers, ways of representing numbers, relationships among numbers and number systems

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Read, write and compare numbers	rote counts to 100	recognizes "how many" in a set of objects	read, write and compare whole numbers less than 100	read, write and compare whole numbers up to 3 digits	read, write and compare decimals to the hundredths place and whole numbers up to 6 digits	read, write, compare and order unit fractions and decimals to thousandths	compare and order integers, positive rationals and percents, including finding their approximate location on a number line	compare and order integers, positive rationals and percents, including finding their approximate location on a number line	compare and order rationals and percents, including finding their approximate locations on a number line	compare and order rational and irrational numbers, including finding their approximate locations on a number line			
ST	MA 1,6 1.6, 1.10	MA 1,6 1.10	MA 1 1.10	MA 1 1.10	MA 5 1.10	MA 5 3.3	MA 5 3.3	MA 5 3.3	MA 5 3.3	MA 5 3.3			
FR	V.1.d, X.a	V.d, X.a	V.d	V.d	IX.b	IX.b	IX.b	IX.b	IX.b	IX.a			
B Represent and use rational numbers			recognize 1/2, 1/3 and 1/4 of a shape	represents commonly used fractions: halves, thirds and fourths	use models, benchmarks (0, 1/2 and 1) and equivalent forms to judge the size of fractions	recognize and generate equivalent forms of commonly used fractions, decimals and percents	recognize and generate equivalent forms of fractions, decimals and percents	use fractions, decimals and percents to solve problems	use fractions, decimals and percents to solve problems		use real numbers to solve problems		
ST			MA 1 1.10	MA 1 1.10	MA 1 3.3	MA 1 3.3	MA 1 3.3	MA 1 3.4	MA 1 3.4		MA 1 3.4		
FR			V.c	V.c, V.i	V.c, V.i	V.b	V.b	V.d	V.d		V.1.a		
C Compose and decompose numbers	connect number words (orally) and quantities they represent	compose or decompose numbers using known facts, doubles and close to doubles	compose or decompose numbers by using a variety of strategies, such as using known facts, tens or landmark numbers to solve problems	recognize equivalent representations for the same number and generate them by decomposing and composing numbers	recognize equivalent representations for the same number and generate them by decomposing and composing numbers	recognize equivalent representations for the same number and generate them by decomposing and composing numbers	recognize equivalent representations for the same number and generate them by decomposing and composing numbers, including expanded notation	recognize equivalent representations for the same number and generate them by decomposing and composing numbers, including exponential notation	recognize equivalent representations for the same number and generate them by decomposing and composing numbers, including scientific notation		use a variety of representations to demonstrate an understanding of very large and very small numbers		use vectors and matrices as systems and compare their properties to the real-number system
ST	MA 1 1.10	MA 1 3.2,3.3	MA 1 3.2,3.3	MA 1 3.6	MA 1 3.6	MA 1 3.6	MA 1 3.6	MA 1 3.6	MA 1 3.6		MA 5 3.6		MA 5
FR	V.c	V.e	V.e	V.e	V.e	V.b	V.b	V.b	V.b		IX.a & d		IX.a & d

Number and Operations

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1. Understand numbers, ways of representing numbers, relationships among numbers and number systems -- continued													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
D **Classify and describe numeric relationships**			skip count by 2s, 5s and 10s	classify numbers by their characteristics, including odd and even	classify and describe numbers by their characteristics, including odd, even and multiples	describe numbers according to their characteristics, including whole number factors, prime or composite, odd or even and square numbers	use factors and multiples to describe relationships between and among numbers, including whole number common factors and multiples	use whole number factors and multiples to describe relationships between and among numbers	use factors and multiples to describe relationships between and among numbers and justify characteristics of numbers				
ST			**MA 1 1.10**	**MA 1 1.10**	**MA 1 1.10**	**MA 5 1.10**	**MA 5 1.10**	**MA 5 1.10**	**MA 5 1.10**				
FR			**V.1.d**	**V.e**	**V.e, IX.d**	**IX.c**	**IX.c**	**IX.c**	**IX.c**				

Number and Operations

3/02/04

2. Understand meanings of operations and how they relate to one another

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Represent operations		represent a given situation involving addition	represent a given situation involving addition or subtraction	represent a given situation involving multiplication	represent and recognize multiplication using various models, including sets and arrays	represent and recognize division using various models, including quotative and partitive							
ST		**MA 1 1.6,1.10**	**MA 1 1.6,1.10**	**MA 1 1.6,1.10**	**MA 1 3.6**	**MA 1 3.6**							
FR		**V.a**	**V.a**	**V.a**	**V.a**								
B Describe effects of operations				describe the effects of adding and subtracting whole numbers as well as the relationship between the two operations		describe the effects of multiplying and dividing whole numbers as well as the relationship between the two operations	describe the effects of addition and subtraction on fractions and decimals	describe the effects of multiplication and division on fractions and addition and subtraction on integers	describe the effects of multiplication and division on integers	describe the effects of operations, such as multiplication, division, and computing powers and roots on the magnitude of quantities			
ST				**MA 1 3.4,4.1**		**MA 5 3.4,4.1**	**MA 1, 5 3.4,4.1**	**MA 1 3.4,4.1**	**MA 1 3.4,4.1**	**MA 4 3.4,4.1**			
FR				**V.e**		**IX.e & c**	**V.a, IX.a**	**V.a**	**V.a**	**VIII.i**			
C Apply properties of operations				apply commutative and identity properties of addition to whole numbers	apply commutative and identity properties of multiplication to whole numbers	apply the distributive and associative properties to whole numbers		apply properties of operations (including order of operations) to positive rational numbers	apply properties of operations to rational numbers, including order of operations and inverse operations	apply properties of exponents (including order of operations) to simplify expressions	apply properties of exponents to simplify expressions or solve equations	apply properties of logarithms to simplify expressions or solve equations	apply properties of functions to simplify expressions or solve equations
ST				**MA 5 1.6,1.10**	**MA 5 1.6,1.10**	**MA 5 1.6,1.10**		**MA 5 1.6,1.10**	**MA 5 1.6,1.10**	**MA 4 1.6,1.10**	**MA 4 1.6,1.10**	**MA 4 1.6,1.10**	**MA 4,5 1.6,1.10**
FR				**IX.c**	**IX.c**	**IX.e**		**IX.e**	**IX.e**	**VIII.c & d**	**VIII.c & d**	**VIII.c & d**	**VIII.c & d, IX.b**

2. Understand meanings of operations and how they relate to one another -- continued													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
D **Apply operations on real and complex numbers**								approximate the value of square roots to the nearest whole number	apply the relationship between squares and square roots and cubes and cube roots to solve a problem	apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases	apply operations to real numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases	apply operations to matrices and complex numbers, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases	apply operations to vectors, using mental computation or paper-and-pencil calculations for simple cases and technology for more complicated cases
ST								**MA 5 3.3**	**MA 5 1.6,3.4**	**MA 1,4,5 1.4,3.4**	**MA 1,4,5 1.4,3.4**	**MA 1,4,5 1.4,3.4**	**MA 1,4,5 1.4,3.4**
FR								**IX.f**	**IX.f**	**V.a, VIII.d, IX.6**	**V.a, VIII.d, IX.6**	**V.a, VIII.d, IX.6**	**V.a, VIII.d, IX.6**

3. Compute fluently and make reasonable estimates

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Describe or represent mental strategies	recognize numerals up to 31	describe or represent the mental strategy used to compute an addition problem	describe or notate the mental strategy used to compute addition or subtraction of whole numbers, including 2-digit numbers		represent a mental strategy used to compute a given multiplication problem (up to 2-digit by 2-digit multiple of)	describe a mental strategy used to compute a given division problem, where the quotient is a multiple of 10 and the divisor is a 1-digit number (e.g., 350 /7)							
ST	MA _ 1.6,1.10	MA 1 3.4,4.1	MA 1 3.4,4.1		MA 5 3.3	MA 1 1.4,3.3							
FR		V.2.a	V.f		IX.d	V.g							
B Develop and demonstrate fluency		develop fluency with basic number relationships of addition and subtraction for sums up to 20	demonstrate fluency with basic number relationships of addition and subtraction for sums up to 20	develop fluency with basic number relationships (12 X 12) of multiplication and division	demonstrate fluency with basic number relationships (12 X 12) of multiplication and division								
ST		MA.1 1.6	MA.1 1.6	MA.1 1.6	MA.1 1.6								
FR		V. 4.e	V. 4.e	V. 4.e	V. 4 .e								
C Compute problems			apply and describe the strategy used to compute 2-digit addition or subtraction problems	apply and describe the strategy used to compute up to a 3-digit addition or subtraction problem	apply and describe the strategy used to compute a given • multiplication problem up to a 2-digit by 2-digit • division problem up to a 3-digit by 1-digit	apply and describe the strategy used to compute a given division problem up to a 3- digit by 2-digit	add and subtract positive rational numbers	multiply and divide positive rational numbers	apply all operations on rational numbers	apply all operations on real numbers			
ST		MA 5 1.6,1.10	MA 5 1.6,1.10	MA 5 3.3,4.1	MA 5 3.3,4.1	MA 1 3.3,4.1	MA 1 1.10,3.3	MA 1 1.10,3.3	MA 1 1.10,3.3	MA 5 1.10,3.3			
FR		IX.e	IX.e	IX.e	IX.d	V.e	V.a	V.a	V.a	IX.a			

3. Compute fluently and make reasonable estimates -- continued													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
D Estimate and justify solutions				estimate and justify the results of addition and subtraction of whole numbers	estimate and justify the results of multiplication of whole numbers	estimate and justify the results of division of whole numbers	estimate and justify the results of addition and subtraction of positive rational numbers	estimate and justify the results of multiplication and division of positive rational numbers	estimate and justify the results of all operations on rational numbers	judge the reasonableness of numerical computations and their results	judge the reasonableness of numerical computations and their results	judge the reasonableness of numerical computations and their results	judge the reasonableness of numerical computations and their results
ST				**MA 1 3.3,4.1**	**MA 1 3.3,4.1**	**MA 1 3.3,4.1**	**MA 1 3.3.4.1**	**MA 1 3.3,4.1**	**MA 1 3.3,4.1**	**MA 1 3.8**	**MA 1 3.8**	**MA 1 3.8**	**MA 1,4 5.8**
FR				**V.2.a**	**V.f**	**V.f**	**V.e & h**	**V.e & h**	**V.e & h**	**V.a**	**V.a**	**V.a**	**V.a, VIII.h**
E Use proportional reasoning							solve problems using equivalent ratios	solve problems involving proportions, such as scaling and finding equivalent ratios	solve problems involving proportions, such as scaling and finding equivalent ratios	solve problems involving proportions	solve problems involving proportions	solve problems involving proportions	solve problems involving proportions
ST							**MA 1 3.3**	**MA 1 3.3**	**MA 1 3.3**	**MA 1,4 3.3**	**MA 1,4 3.3**	**MA 1,4 3.3**	**MA 1,4 3.3**
FR							**V.c**	**V.c & f**	**V.c & f**	**V.a, VIII.e**	**V.a, VIII.e**	**V.a, VIII.e**	**V.a, VIII.e**

Algebraic Relationships

3/02/04

1. Understand patterns, relations and functions

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Recognize and extend patterns	recognize or repeat sequences of sounds or shapes	extend patterns of sound, shape, motion or a simple numeric pattern	describe and extend simple numeric patterns and change from one representation to another	extend geometric (shapes) and numeric patterns to find the next term	describe geometric and numeric patterns	make and describe generalizations about geometric and numeric patterns							
ST	MA 4 1.6	MA 4 1.6	MA 4 1.6	MA 4 1.6	MA 4 1.6,4.1	MA 4 1.6,4.1							
FR	VIII.a	VIII.a	VIII.1.b	VIII.a	VIII.b	VIII.4.a							
B Create and analyze patterns	create and continue patterns	describe how simple repeating patterns are generated	describe how simple growing patterns are generated	represent patterns using words, tables or graphs	analyze patterns using words, tables and graphs	represent and analyze patterns using words, tables and graphs	represent and describe patterns with tables, graphs, pictures, symbolic rules or words	analyze patterns represented graphically or numerically using words or symbolic rules, including recursive notation	generalize patterns represented graphically or numerically using words or symbolic rules, including recursive notation	generalize patterns using explicitly or recursively defined functions	generalize patterns using explicitly or recursively defined functions	generalize patterns using explicitly or recursively defined functions	generalize patterns using explicitly or recursively defined functions
ST		MA 4 1.6, 3.5	MA 4 1.6,3.5	MA 4 3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.5	MA 4 1.6,3.5	MA 4 1.6,3.5	MA 4 1.6,3.5
FR		VIII.a	VIII.a	VIII.3.a	VIII.4.b	VIII.4.b	VIII.4.b, VIII.3	VIII.4.b	VIII.4.b	VIII.1.b	VIII.1.b	VIII.1.b	VIII.1.b
C Classify objects and representations	sort objects by size	classify objects by size or number	classify objects by size, number or other attributes				compare various forms of representations to identify a pattern	compare and contrast various forms of representations of patterns	compare and contrast various forms of representations of patterns	compare and contrast various forms of representations of patterns	compare and contrast various forms of representations of patterns	compare and contrast various forms of representations of patterns	compare and contrast various forms of representations of patterns
ST	MA 2 1.8	MA 2 1.8	MA 2,6 1.8				MA 4 1.6	MA 4 1.6	MA 4 1.6	MA 4 1.6	MA 4 1.6	MA 4 1.6	MA 4 1.6
FR	VI.a	VI.a	VI.a, X.c				VIII.3.b	VIII.3.b	VIII.3.b	VIII.a & h	VIII.a & h	VIII.a & h	VIII.a & h

1. Understand patterns, relations and functions -- continued

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
D Identify and compare functions							identify functions as linear or nonlinear from a table or graph	identify functions as linear or nonlinear from tables, graphs or equations	compare properties of linear functions between or among tables, graphs and equations	understand and compare the properties of linear and exponential functions (include intercepts)	understand and compare the properties of linear, exponential and quadratic functions (include domain and range)	understand and compare the properties of linear, quadratic, exponential, logarithmic and rational functions (include asymptotes)	understand and compare the properties of exponential, polynomial, rational, logarithmic, and periodic functions
ST							MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6
FR							VIII.b & c	VIII.b & c	VIII.b & c	VIII.b & c	VIII.b & c	VIII.b & c	VIII.4.h
E Describe the effects of parameter changes										describe the effects of parameter changes on linear functions	describe the effects of parameter changes on quadratic and exponential functions	describe the effects of parameter changes on logarithmic and exponential functions	describe the effects of parameter changes on polynomial and periodic function
ST										MA 4 1.6,4.1	MA 4 1.6,4.1	MA 4 1.6,4.1	MA 4 1.6,4.1
FR										VIII.i	VIII.i	VIII.i	VIII.i

Algebraic Relationships

3/02/04

2. Represent and analyze mathematical situations and structures using algebraic symbols

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Represent mathematical situations		represent a mathematical situation as an expression or number sentence	represent a mathematical situation as an expression or number sentence	represent a mathematical situation as an expression or number sentence	represent a mathematical situation as an expression or number sentence	represent a mathematical situation as an expression or number sentence using a letter or symbol	use variables to represent unknown quantities in expressions	use variables to represent unknown quantities in equations and inequalities	use symbolic algebra to represent and solve problems that involve linear relationships, including recursive relationships	use symbolic algebra to represent and solve problems that involve linear relationships, including absolute value and recursive relationships	use symbolic algebra to represent and solve problems that involve quadratic relationships, including recursive relationships	use symbolic algebra to represent and solve problems that involve exponential and logarithmic relationships, including recursive and parametric relationships	use symbolic algebra to represent and solve problems that involve periodic relationships, including recursive and parametric relationships
ST		**MA 4 1.6,3.1**	**MA 4 1.6,3.1**	**MA 4 1.6,3.1**	**MA 4 1.6,3.1**	**MA 4 1.6,3.1**	**MA 4 1.6,3.1**	**MA 4 1.6,3.1**	**MA 4 1.6,3.1**	**MA 4,6 1.6,3.1**	**MA 4,6 1.6,3.1**	**MA 4,6 1.6,3.1**	**MA 4,6 1.6,3.1**
FR		**VIII.2.b, VIII.5.c**	**VIII.2.b, VIII.5.c**	**VIII.2.b**	**VIII.2.b**	**VIII.2.e**	**VIII 2 e**	**VIII.2.e**	**VIII.2.e**	**VIII.c & d, X.h**	**VIII.c & d, X.h**	**VIII.c & d, X.h**	**VIII.c & d, X.h**
B Describe and use mathematical manipulation			investigate commutative principle with whole numbers	apply the commutative property to addition of whole numbers	apply the commutative property of multiplication to whole numbers	apply the distributive and associative properties to whole numbers	recognize equivalent forms for simple algebraic expressions (associative, distributive properties)	generate equivalent forms for simple algebraic expressions	generate equivalent forms for linear expressions	describe and use algebraic manipulations, including factoring and rules of integer exponents	describe and use algebraic manipulations, including factoring and rules of integer exponents	describe and use algebraic manipulations, including inverse of functions, composition of functions and rules of exponents	describe and use algebraic manipulations, including inverse of functions, composition of functions
ST			**MA 5 3.1**	**MA 5 3.1**	**MA 5 3.1**	**MA 5 3.1**	**MA 5 3.6**	**MA 4 3.6**	**MA 4 3.6**	**MA 4 3.1,4.1**	**MA 4 3.1,4.1**	**MA 4 3.1,4.1**	**MA 4 3.1,4.1**
FR			**IX.1**	**IX.1**	**IX.1**	**IX.1**	**IX.1**	**VIII.a**	**VIII.a**	**VIII.a & d**	**VIII.a & d**	**VIII.a & d & g**	**VIII.a & d & g**

2. Represent and analyze mathematical situations and structures using algebraic symbols -- continued													
	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
C Utilize equivalent forms										use and solve equivalent forms of equations and inequalities (linear)	use and solve equivalent forms of equations and inequalities (piece-wise and quadratic)	use and solve equivalent forms of equations and inequalities (exponential, logarithmic and rational)	use and solve equivalent forms of equations and inequalities (polynomial and trigonometric)
ST										MA 4 1.6,3.4	MA 4 1.6,3.4	MA 4 1.6,3.4	MA 4 1.6,3.4
FR										VIII.d & e	VIII.d	VIII.d	VIII.e & h
D Utilize systems										use and solve systems of linear equations with 2 variables	use and solve systems of linear equations or inequalities with 2 variables	use and solve systems of linear and quadratic equations or inequalities with 2 variables	use and solve systems of equations or inequalities
ST										MA 4 1.6	MA 4 1.6	MA 4 1.6	MA 4 1.6
FR										VIII.b & d	VIII.b & d	VIII.b & d	VIII.b & d

3. Use mathematical models to represent and understand quantitative relationships

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Use mathematical models	model situations that involve whole numbers, using pictures, objects or symbols	model situations that involve the addition of whole numbers, using pictures, objects or symbols	model situations that involve addition and subtraction of whole numbers, using pictures, objects or symbols	model problem situations, including multiplication with objects or drawings	model problem situations, using representations such as graphs, tables or number sentences	model problem situations and draw conclusions, using representations such as graphs, tables or number sentence	model and solve problems, using multiple representations such as graphs, tables, expressions and equations	model and solve problems, using multiple representations such as graphs, tables, expressions, equations or inequalities	model and solve problems, using multiple representations such as graphs, tables, equations or inequalities	identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem (including recursive forms)	identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem (including recursive forms)
ST	MA 1,4 1.6,3.6	MA 1,4 1.6,3.6	MA 1,4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6	MA 4 1.6,3.6
FR	V.c, VIII.1	V.c, VIII.1	V.c, VIII.1	VIII.I	VIII.I	VIII.b	VIII.b	VIII.b	VIII.b	VIII.c	VIII.c	VIII.c & h	VIII.c & h

4. Analyze change in various contexts

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Analyze change			describe qualitative change, such as students growing taller	describe quantitative change, such as students growing two inches in a year	describe mathematical relationships in terms of constant rates of change	identify, model and describe situations with constant or varying rates of change	compare situations with constant or varying rates of change	compare situations with constant or varying rates of change	analyze the nature of changes (including slope and intercepts) in quantities in linear relationships	analyze linear functions by investigating rates of change and intercepts	analyze quadratic functions by investigating rates of change, intercepts and zeros	analyze exponential and logarithmic functions by investigating rates of change, intercepts and asymptotes	analyze rational, polynomial and periodic functions by investigating rates of change, intercepts and asymptotes
ST			MA 4 4.1	MA 4 4.1	MA 4 4.1	MA 4 1.6,4.1	MA 2,4 1.6,4.1	MA 2,4 1.6,4.1	MA 2,4 1.6,4.1	MA 4 1.6,4.1	MA 4 1.6,4.1	MA 4 1.6,4.1	MA 4 1.6,4.1
FR			VIII.b	VIII.b	VIII.c	VIII.c	VI I, VIII.c	VI I, VIII.c	VI.I, VIII.c	VIII.a & c	VIII.a & c	VIII.a & c	VIII.h & g

Geometric and Spatial Relationships

3/02/04

1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
A **Describe and use geometric relationships**	sort 2- and 3-dimensional shapes using physical models (circle, rectangle, triangle, sphere, rectangular prism, cylinder, pyramid)	recognize and name 2- and 3-dimensional shapes using physical models (circle, triangle, trapezoid, rectangle, rhombus, sphere, rectangular prism, cylinder, pyramid)	describe attributes and parts of 2- and 3-dimensional shapes (circle, triangle, trapezoid, rectangle, rhombus, sphere, rectangular prism, cylinder, pyramid)	compare 2- and 3-dimensional shapes by describing their attributes (circle, rectangle, rhombus, trapezoid, triangle, rectangular prism, cylinder, pyramid and sphere)	identify and describe the attributes of 2- and 3-dimensional shapes (prisms, cones, parallelism, perpendicularity)	analyze 2- and 3-dimensional shapes by describing the attributes	identify the properties of 1-2- and 3-dimensional shapes using the appropriate geometric vocabulary	classify 2- and 3-dimensional shapes based on their properties	describe, classify and generalize relationships between and among types of a) 2-dimensional objects and b) 3-dimensional objects using their defining properties including • Pythagorean Theorem • cross-section of a 3-dimensional object results in what 2-dimensional shape	solve problems involving angle relationships (supplementary, complementary angles) and Pythagorean Theorem	use inductive and deductive reasoning to establish the validity of geometric conjectures, proved theorems and critique arguments made by others	use trigonometric relationships with right triangles to determine lengths and angle measures	use trigonometric relationships to determine lengths and angle measures in all types of triangles
ST	**MA 2 1.6**	**MA 2 1.6,1.10**	**MA 2 1.6,1.10**	**MA 2 1.6,1.10**	**MA 2 1.6,1.10**	**MA 2 1.5,4.1**	**MA 2 1.10,3.3**	**MA 2 3.6**	**MA 2 1.6,3.6**	**MA 2 1.6**	**MA 2 3.5**	**MA 2 1.6,1.10**	**MA 2 1.6,1.10**
FR	**VI.2**	**VI.2.a**	**VI.2.a**	**VI.2.c**	**VI.2.a**	**VI.2**	**VI.2.a**	**VI.2.a**	**VI.c**	**VI.c**	**VI.d**	**VI.l**	**VI.l**
B **Apply geometric relationships**							describe relationships between the corresponding angles and the length of corresponding sides of similar triangles (whole number scale factors)	describe relationships between corresponding sides, corresponding angles and corresponding perimeters of similar polygons	apply relationships between corresponding sides and corresponding areas of similar polygons to solve problems	apply geometric properties and relationships, such as similarity, to solve multi-step problems in 2 dimensions	apply relationships among surface areas and among volumes of similar objects	determine the effect on surface area or volume of changing one measurement	
ST							**MA 2 1.6**	**MA 2 1.6**	**MA 2 1.6,3.6**	**MA 2 3.6**	**MA 2 3.6**	**MA 2 3.5**	
FR							**VI.c**	**VI.c**	**VI.c**	**VI.c**	**VI.c & i**	**VI.i**	

1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships -- continued													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
C Compose and decompose shapes				predict the results of putting together or taking apart 2- and 3-dimensional shapes	describe the results of subdividing, combining and transforming shapes	predict and justify the results of subdividing, combining and transforming shapes							
ST				**MA 2 1.6,4.1**	**MA 2 1.6,4.1**	**MA 2 1.6,4.1**							
FR				**VI.2.b**	**VI.b**	**VI.b**							

2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
A Use coordinate systems	describe, name and interpret relative positions in space (above, below, front, behind)	describe, name and interpret relative positions in space (left, right)	find and name locations with simple relationships on a map (coordinate system)	describe location using common language and geometric vocabulary (forward, back, left, right, north, south, east, west)	describe movement using common language and geometric vocabulary (forward, back, left, right, north, south, east, west)	use coordinate systems to specify locations, describe paths and find the distance between points along horizontal and vertical lines	use coordinate geometry to construct geometric shapes	given ordered pairs, identify geometric shapes in the coordinate plane using their properties	use coordinate geometry to analyze properties of right triangles and quadrilaterals	solve problems related to 2-dimensional objects by finding the distance on a Cartesian plane	make conjectures and solve problems involving 2-dimensional objects represented with Cartesian coordinates	use vectors to represent and analyze problems involving velocity and direction	use Cartesian coordinates and other coordinate systems to analyze geometric situations, such as navigational, polar or spherical systems
ST	**MA 2 3.3,4.1**	**MA 2 3.3,4.1**	**MA 2 3.3,4.1**	**MA 2 3.3,4.1**	**MA 2 3.3,4.1**	**MA 2 1.6,1.8**	**MA 2 1.6,1.8**	**MA 2 1.6,1.8**	**MA 2 3.6**	**MA 2 3.2**	**MA 2 3.6,4.1**	**MA 2 3.6,4.1**	**MA 2 3.6,4.1**
FR	**VI.4.i**	**VI.4.i**	**VI.4.i**	**VI.4.i**	**VI.4.i**	**VI.e**	**VI.a**	**VI.c**	**VI.f**	**VI.f**	**VI.f**	**VI.h**	**VI.e**

3. Apply transformations and use symmetry to analyze mathematical situations

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Use transformations on objects		use manipulatives to model slides and turns	use manipulatives to model flips	determine if two objects are congruent through a slide, flip or turn	predict the results of sliding/ translating, flipping/ reflecting or turning/ rotating around the center point of a polygon	predict, draw and describe the results of sliding/ translating, flipping/ reflecting and turning/ rotating around a center point of a polygon	describe the transformation from a given pre-image to its image using the terms reflection/flips, rotation/turn and translation/ slide	reposition shapes under informal transformations, such as reflection (flip), rotation (turn) and translation (slide)	reposition shapes under formal transformations, such as reflection, rotation and translation	represent translations, reflections, rotations, and dilations of objects in the coordinate plane	use and apply constructions to represent translations, reflections, rotations, and dilations of objects	use and apply matrices to represent translations, reflections, rotations, and dilations	determine the final outcome of successive trans-formations using various methods (e.g., sketches, constructions and matrices)
ST		MA 2 1.4	MA 2 1.4	MA 2 3.6	MA 2 3.6,4.1	MA 2 3.6,4.1	MA 2 3.7	MA 2 3.6	MA 2 3.6	MA 2 1.10	MA 2 1.10	MA 2 1.10	MA 2 3.6
FR		VI	VI	VI.f	VI	VI.b	VI.b	VI.b	VI.b	VI.b	VI.b	VI.g	VI.f
B Use transformations on functions								describe the relationship between the scale factor and the perimeter of the image using a dilation (contractions-magnifications) (stretching/shrin-king)	describe the relationship between the scale factor and the area of the image using a dilation (stretching/ shrinking)	translate and reflect linear functions	translate, dilate and reflect quadratic and exponential functions	perform simple transformations and their compositions on linear, quadratic, logarithmic and exponential functions	perform simple trans-formations and their compositions on linear, quadratic, logarithmic, exponential, rational and periodic functions
ST								MA 2 3.6	MA 2 3.6	MA 4 3.1	MA 4 3.1	MA 4 3.1	MA 4 3.1
FR								VI.b & g	VI.b & g	VIII,I	VIII.i	VIII.i	VIII.i
C Use symmetry			recognize and create shapes that have symmetry	identify lines of symmetry in polygons	construct a figure with multiple lines of symmetry and identify the lines of symmetry	identify polygons and designs with rotational symmetry	create polygons and designs with rotational symmetry	determine all lines of symmetry of polygons	identify the number of rotational symmetries of regular polygons		identify types of symmetries of 2- and 3-dimensional figures		
ST			MA 2 1.10	MA 2 1.10	MA 2 1.10	MA 2 1.6	MA 2 1.6	MA 2 1.6	MA 2 1.6		MA 2 1.6,1.10		
FR			VI.f	VI.f	VI.	VI.b	VI.b	VI.b	VI.b		VI.f		

4. Use visualization, spatial reasoning and geometric modeling to solve problems													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
A Recognize and draw three-dimensional representations	recognize geometric shapes in the student's environment (stop sign, number cube, ball)	recognize geometric shapes and structures in the student's environment and specify the shape's location	recognize and represent shapes from different perspectives		given the picture of a prism, identify the shapes of the faces	given a net of a prism or cylinder, identify the 3-dimensional shape	use spatial visualization to identify isometric representations of mat plans	use spatial visualizations to identify various 2-dimensional views of isometric drawings	create isometric drawings from a given mat plan	draw and use vertex-edge graphs or networks to find optimal solutions	draw representations of 3-dimensional geometric objects using a variety of tools	draw representations of 3-dimensional geometric objects from different perspectives using a variety of tools	recognize 3-dimensional objects and spaces from different perspectives and analyze their cross sections
ST	**MA 2 3.3**	**MA 2 3.3**	**MA 2 3.6**		**MA 2 3.3**	**MA 2 3.3**	**MA 2 3.3**	**MA 2 3.3**	**MA 2 3.3**	**MA 6 3.4**	**MA 2 1.4**	**MA 2 1.4**	**MA 2 3.6**
FR	**VI.3.e**	**VI.3 & 4.e & f**	**VI**		**VI.3.c or b**	**VI**	**VI.a**	**VI.a**	**VI.a**	**X.a**	**VI.a**	**VI.a**	**VI.a**
B Draw and use visual models							draw or use visual models to represent and solve problems	draw or use visual models to represent and solve problem	draw or use visual models to represent and solve problems	draw or use visual models to represent and solve problems	draw or use visual models to represent and solve problems	draw or use visual models to represent and solve problems	draw or use visual models to represent and solve problems
ST							**MA 2 3.1**	**MA 2 3.1**	**MA 2 3.1**	**MA 2 3.1**	**MA 2 3.1**	**MA 2 3.1**	**MA 2 3.1**
FR							**VI.d**	**VI.d**	**VI.d**	**VI.b & i**	**VI.b & i**	**VI.b & i**	**VI.b & i**

1. Understand measurable attributes of objects and the units, systems and processes of measurement

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Determine unit of measurement	compare and order objects according to their size or weight	select the appropriate tool for the attribute being measured	select an appropriate unit and tool for the attribute being measured	Identify, justify and use the appropriate unit of measure (linear, time, weight)	identify and justify the unit of linear measure including perimeter and (customary metric)	identify and justify the unit of measure for area (customary and metric)	identify and justify an angle as acute, obtuse, straight or right	identify and justify the unit of measure for volume (customary and metric)		identify and justify appropriate units of measure for velocity			
ST	MA 2 1.8	MA 2 1.4,3.7	MA 2 1.4,3.7	MA 2 3.1, 4.1	MA 2 3.1,4.1	MA 2 3.1,4.1	MA 2 3.1,4.1	MA 2 3.1,4.1		MA 1,2 3.1,4.1			
FR	VI.1.h	VI.1.h	VI.1.h	VI.h	VI.h	VI.f	VI.g	VI.f & g		V.a, VI.d			
B Identify equivalent measures					identify equivalent linear measures within a system of measurement	identify the equivalent weights and equivalent capacities within a system of measurement		identify the equivalent area measures within a system of measurement (e.g., sq ft. to sq in.)	identify the equivalent volume measures within a system of measurement (e.g., m^3 to cm^3)			compare and contrast intensity levels within a system of measure (decibels, ph)	compare and contrast between angle and radian measure
ST					MA 2 1.6	MA 2 1.6		MA 2 1.6	MA 2 1.6			MA 1 3.1	MA 2 3.1
FR					VI.h	VI.f		VI.i	VI.i			V.c	VI.d
C Tell and use units of time	describe passage of time using terms such as today, yesterday, tomorrow	tell time to the nearest hour	tell time to the nearest half hour	tell time to the nearest five minutes	tell time to the nearest minute	solve problems involving elapsed time (hours)	solve problems involving elapsed time (hours and minutes)	solve problems involving addition and subtraction of time (hours, minutes and seconds)					
ST	MA 2 3.3	MA 2 3.3	MA 2 3.3	MA 2 3.3	MA 2 3.3		MA 5 3.1	MA 5 3.1					
FR	VI.1.g & h	VI.1.g & h	VI.g & h	VI.g & h	VI.f		IX.d	IX.d					

1. Understand measurable attributes of objects and the units, systems and processes of measurement -- continued													
	Kindergarten	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade 5**	**Grade 6**	**Grade 7**	**Grade 8**	**Grade 9**	**Grade 10**	**Grade 11**	**Grade 12**
D **Count and compute money**	identify and know the value of a penny, nickel and dime	count money to fifty cents, including quarters and half dollars	count money to a dollar	determine change from $5.00 and add and subtract money values to $5.00	determine change from $10.00 and add and subtract money values to $10.00								
ST													
FR													

2. Apply appropriate techniques, tools and formulas to determine measurements

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Use standard or non-standard measurement	measure with multiple copies of a unit of the same size (e.g., paper clips laid end to end)	use repetition of a single unit to measure something larger than the unit, (e.g., measuring the length of the room with a single meter stick)	use tools to measure (size, temperature, time, weight) to the nearest inch, centimeter, degree, hour and pound	use a referent for measures to make comparisons and estimates	select and use benchmarks to estimate measurements (linear, capacity, weight)		estimate a measurement using either standard or non-standard unit of measurement						
ST	MA 2 3.3	MA 2 3.3	MA 2 1.4,3.3	MA 2 1.6,3.3	MA 2 1.6,3.3		MA 2 1.6,3.3						
FR	VI.5.h	VI.5.h	VI.5.g.h	VI.5.h	VI.d		VI.e & f						
B Use angle measurement					select and use benchmarks to estimate measurements of 0-, 45-, 90-degree angles		select and use benchmarks to estimate measurements of 0-, 45-, 90-, 180-, 360-degree angles	use tools to measure angles to the nearest degree	use tools to determine the measure of reflex angles to the nearest degree	solve problems of angle measure, including those involving triangles or other polygons	solve problems of angle measure of parallel lines cut by a transversal		
ST					MA 2 3.4		MA 2 3.4	MA 2 1.4,3.2	MA 2 1.4,3.2	MA 2 3.1,3.4	MA 2 3.1,3.4		
FR					VI.d		VI.f & g	VI.f	VI.f	VI.i	VI.f & i		
C Apply geometric measurements				determine the perimeter of polygons	determine the area of a polygon on a rectangular grid	describe how to solve problems involving the area of polygons and non-polygonal regions imposed on a rectangular grid	describe how to solve problems involving the area or perimeter of polygons	describe how to solve problems involving circumference and/or area of a circle	describe how to solve problems involving surface area and/or volume of a rectangular or triangular prism, or cylinder	determine the surface area, and volume of geometric figures, including cones, spheres, and cylinders	determine the surface area, and volume of geometric figures, including cones, spheres, and cylinders		
ST				MA 2 1.10	MA 2 1.10	MA 2 3.1,4.1	MA 2 3.4 ,4.1	MA 2 3.4,4.1	MA 2 3.4,4.1	MA 2 1.10,3.4	MA 2 1.10,3.4		
FR				VI.g	VI.g	VI.i	VI.i & g	VI.i & g	VI.i & g	VI. i	VI.i		

2. Apply appropriate techniques, tools and formulas to determine measurements -- continued

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
D Analyze precision								analyze precision and accuracy in measurement situations	analyze precision and accuracy in measurement situations and determine number of significant digits	analyze effects of computation on precision	analyze effects of computation on precision	apply concepts of successive approximation	apply concepts of successive approximation, upper and lower bounds and limit in measurement situations
ST								MA 2 1.7,3.8	MA 2 1.7, 3.8	MA 2 1.7,3.8	MA 2 1.7, 3.8	MA 2 1.6,3.4	MA 2 1.6,3.4
FR								VI.f	VI.f	VI.k	VI.k	VI.k	VI.k
E Use relationships within a measurement system						convert from one unit to another within a system of measurement (linear)	convert from one unit to another within a system of measurement (mass and weight)	convert from one unit to another within a system of measurement (capacity)	convert square or cubic units to equivalent square or cubic units within the same system of measurement	use unit analysis to solve problems involving rates		use unit analysis to solve problems involving rates, such as speed, density or population density	use unit analysis to solve problems involving rates, such as circular velocity, acceleration or flow rates
ST						MA 2 1.6,1.10	MA 2 1.6,1.10	MA 2 1.6,1.10	MA 2 1.6,1.10	MA 4 3.1		MA 4 3.1	MA 4 3.1
FR						VI.e & f	VI.e & f	VI.e & f	VI.e & f	VIII.b		VIII.b	VIII.b

Data and Probability

3/02/04

1. Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Formulate questions	pose questions and gather data about themselves and their surroundings	pose questions and gather data about themselves and their surroundings	pose questions and gather data about themselves and their surroundings	design investigations to address a given question	collect data using observations, surveys and experiments	evaluate data-collection methods	formulate questions, design studies and collect data about a characteristic	formulate questions, design studies and collect data about a characteristic	formulate questions, design studies and collect data about a characteristic	formulate questions, design studies and collect data about a characteristic	formulate questions, design studies and collect data about a characteristic	formulate questions, design studies and collect data about a characteristic	formulate questions, design studies and collect data about a characteristic
ST	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2	MA 3 1.2
FR	VII.1.a	VII.1.a	VII.1.a	VII.1.c	VII.1.a	VII.a	VII.a	VII.a	VII.a	VII.a	VII.a	VII.a	VII.a
B Classify and organize data	sort items according to their attributes	sort and classify items according to their attributes	sort and classify items according to their attributes and organize data about the items										
ST	MA 2 1.8	MA 2 1.8	MA 2,3 1.8										
FR	VI.a	VI.a	VI.a,VII.3										
C Represent and interpret data	represent data using physical objects	represent data using pictures and bar graphs	represent data using pictures and bar graphs	read and interpret information from line plots and graphs (bar, line, pictorial)	create tables or graphs to represent categorical and numerical data (including line plots)	describe methods to collect, organize and represent categorical and numerical data	interpret circle graphs; create and interpret stem-and-leaf plots	select, create and use appropriate graphical representation of data, including circle graphs, histograms and box plots (box and whiskers)	select, create and use appropriate graphical representation of data (including scatter plots)	select, create and use appropriate graphical representation of data	select, create and use appropriate graphical representation of data	describe the characteristics of well designed studies, including the role of randomization in survey and experimental research	describe differences among various studies and which types of inferences can legitimately be drawn from each
ST	MA 3 1.8	MA 3 1.8	MA 3 1.8	MA 3 1.8	MA 3 1.8	MA 3 1.2	MA 3 1.8	MA 3 1.8,3.6	MA 3 1.8, 3.6	MA 6 1.8, 3.6	MA 6 1.8,3.6	MA 3 1.2,3.1	MA 3 1.5
FR	VII.3	VII.3	VII.3	VII.b	VII.a	VII.a	VII.b	VII.b		X.b	X.b	VII.c & e	VII.c & e

2. Select and use appropriate statistical methods to analyze data

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A **Describe and analyze data**				describe the shape of data and analyze it for patterns	describe important features of the data set	compare related data sets	find the range and measures of center, including median, mode and mean	find, use and interpret measures of center and spread, including ranges and interquartile range	find, use and interpret measures of center, outliers and spread, including range and interquartile range	apply statistical concepts to solve problems	apply statistical concepts to solve problems and distinguish between a statistic and a parameter	apply statistical concepts to solve problems and distinguish between a statistic and a parameter	apply statistical concepts to solve problems and distinguish between a statistic and a parameter
ST				**MA 3 1.6**	**MA 3 4.1**	**MA 3 3.6**	**MA 3 3.2**	**MA 3 3.4**	**MA 3 3.4**	**MA 3 1.10,3.4**	**MA 3 1.10,3.4**	**MA 3 1.10,3.4**	**MA 3 1.10,3.4**
FR				**VII.b**	**VII.b**	**VII.c**	**VII.c**		**VII.c**	**VII.g**	**VII.g**	**VII.g**	**VII.g**
B **Compare data representations**						compare different representations of the same data and evaluate how well each representation shows important aspects of the data	compare different representations of the same data and evaluate how well each representation shows important aspects of the data	compare different representations of the same data and evaluate how well each representation shows important aspects of the data	compare different representations of the same data and evaluate how well each representation shows important aspects of the data	given one-variable quantitative data, display the distribution and describe its shape	given one-variable quantitative data, display the distribution and describe its shape	given one-variable quantitative data, display the distribution, describe its shape and calculate summary statistics	recognize how linear transformations of single-variable data affect shape, center, and spread
ST						**MA 3 3.6**	**MA 3 3.6**	**MA 3 3.6**	**MA 3 3.6**	**MA 3 1.8**	**MA 3 1.8**	**MA 3 1.8,1.10**	**MA 3 3.1**
FR						**VII.d & e**	**VII.d**	**VII.d**	**VII.d**	**VII.d & i**	**VII.d & i**	**VII.d & i**	**VII.d**
C **Represent data algebraically**										given a scatterplot, determine an equation for a line of best fit	display and analyze bivariate data where one variable is categorical and the other is numerical	given a scatterplot, determine a type of function which models the data	create a scatterplot, describe its shape, determine and analyze regression equations using technological tools
ST										**MA 3 1.6**	**MA 3 1.6**	**MA 3 1.6**	**MA 3 1.4,1.6**
FR										**VII.b**	**VII.e**	**VII.b**	**VII.d**

3. Develop and evaluate inferences and predictions that are based on data

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A Develop and evaluate inferences				discuss events related to students' experiences as likely or unlikely	given a set of data, propose and justify conclusions that are based on the data	given a set of data make and justify prediction(s)	use observations about differences between 2 samples to make conjectures about the populations from which the samples were taken	use observations about differences between samples to make conjectures about the populations from which the samples were taken	make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatter plots of the data and approx imate lines of fit	make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatter plots of the data and approximate lines of fit	describe how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference	use simulations to describe the variability of sample statistics from a known population and to construct sampling distributions	evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions
ST				MA 3 3.3	MA 3 3.1,4.1	MA 3 3.1,4.1	MA 3 3.5	MA 3 3.5	MA 3 3.5		MA 3 3.5	MA 3 1.2	MA 3 1.5
FR				VII.d	VII.c	VII.c	VII.e	VII.e	VII.e		VII.a	VII.f	VII.a
B Analyze basic statistical techniques													describe how basic statistical techniques are used in the workplace.
ST													MA 3 1.4
FR													VII.i

4. Understand and apply basic concepts of probability

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
A **Apply basic concepts of probability**						describe the degree of likelihood of events using such words as certain, equally likely and impossible	use a model (diagrams, list, sample space, or area model) to illustrate the possible outcomes of an event	use models to compute the probability of an event	make conjectures (based on theoretical probability) about the results of experiments	construct sample spaces and distributions	describe the concepts of sample space and probability distribution	compute and interpret the expected value of random variables	use simulations to construct empirical probability distributions
ST						**MA 3 4.1**	**MA 3,6 3.2**	**MA 3,6 3.3**	**MA 3 3.5**	**MA 3 3.1**	**MA 3 4.1**	**MA 3 3.1**	**MA 3 1.2**
FR						**VII.g**	**VII.g, X.c**	**VII.h & g, X.c**	**VII.g**	**VII.f**	**VII.e**	**VII.h**	**VII.j**
B **Use and describe compound events**											use and describe the concepts of conditional probability and independent events	use and describe how to compute the probability of a compound event	
ST											**MA 6 1.10,4.1**	**MA 2 3.1**	
Fr											**X.d**	**VI.g**	